

FACTORS RELATIVE TO THE OCCURRENCE AND DISTRIBUTION OF ILLNESS IN A HOMOGENEOUS POPULATION OF OSTENSIBLY HEALTHY INDIVIDUALS¹

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In the study of two large ostensibly healthy and homogeneous population groups, Hinkle and Plummer found that illness of all sorts was not distributed sporadically or at random (1). In each of the two groups, a small percentage of the population experienced far more than its share of illnesses of all sorts and had far more than the expected amount of absences, injuries, and operations. Analysis of the data revealed that the differences in total amounts of illness could not be accounted for entirely by malingering, hereditary influences, economic background, nutrition, or exposure to infection. However, in contrast to those informants who were well, the ill members of the group had been exposed throughout much of their adult life to situations which they perceived as stressful. It is the thesis of these authors that the alterations in bodily function which accompanied their attempts to adapt to their social environment (2) appeared to be a most important factor in their susceptibility to disease. The present study was undertaken in an attempt to test further and, if possible, to extend this hypothesis.

METHOD

A population group for study was chosen which differed as widely as possible from the two population groups studied earlier (see figure 1). One hundred adult Chinese born and reared in China and now resident in the United States comprised the group studied. The ages of the group ranged from 19 to 73, with 87 per cent of the group aged 20 to 45. There were 69 men and 31 women. Most of

the members of the group had come from the "upper classes" in China and had had the equivalent of 4 or more years of college. The majority of them are engaged in scholarly or academic pursuits in the United States. All at the time of the examination were ostensibly healthy and engaged in some productive activity. Most of the members of the group had come to the United States shortly after the termination of World War II to pursue their studies; and for a variety of reasons are unwilling or unable to return either to the Chinese mainland or to Formosa. The group shared a common cultural experience and social background. All had experienced cultural change, geographic dislocation, and the hazards of war and enemy occupation, together with an approximately equal exposure to the bacterial, viral and protozoal pathogens which abounded in their environment. While the members of the group have these factors in common, they can by no means be stated to be truly representative of China as a whole, and no attempt will be made to extrapolate from this group to Chinese in general.

The informants were obtained through the intercession of a Chinese with social and business contacts in the city. The group was studied by a team consisting of psychiatrists, anthropologists, sociologists, psychologists, and internists. Each member of the group was studied for a total of 16 or more hours by these five disciplines. The material was obtained by means of interviews, questionnaires, psychological tests, including the Wechsler-Bellevue Intelligence Scale Form I, Rorschach, Lowenfeld Mosaic, a projective questionnaire, Sacks sentence completion, Thurstone's Temperament Scale and Human figure drawing.

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FIG. 1. Characteristics of the three groups

	Group I	Group II	Group III
Total number studied	1,297	1,527	100
Number studied intensively	336	279	100
Age	17-50	17-55	19-72
Sex	Women	Men	Men and women
Cultural background	2nd generation Irish and Italian American	Mixed indigenous American	Chinese
Socio-economic background	Upper-lower class	Lower-middle class	Upper class
Education	Grammar school	High school	College
Occupation	Unskilled white-collar	Skilled workmen	Grad. students prof. men
Lifetime environment	Metropolitan New York	Metropolitan New York	Various parts of China (later U.S.)
Sanitation of general surroundings	Generally high	Generally high	Generally very low
Exposure to pathogens and trauma	Low	Moderate	High
Physical deprivations, pressures and dislocations	Few	Few	Many
Social dislocations and situations of uncertainty	Few	Few	Many

A thematic apperception test was given to about one-third of the group. The medical data were obtained by means of complete medical history, Cornell Medical Index in English or Chinese, a detailed biography with emphasis on the settings of all illnesses, physical examination and appropriate laboratory, x-ray, and electrocardiographic and electroencephalographic examinations. This paper, while containing principally the material obtained by the internists in the group, draw to a certain extent on material obtained by the other disciplines.

The raw data obtained in the previously described manner were subjected to much the same sort of analysis as the material in the two earlier studies.

Although the validity of the data depends to a large extent on the accuracy of the memories of the informants and their capacity to communicate, the following considerations supporting the reliability of the material are apparent.

1) The intelligence of the group and its capacity to use the English language are evident from the fact that the mean I.Q. on the Wechsler-Bellevue test given in English was 120.

2) The earlier studies on the two American groups revealed that there was a high degree of correlation between employer's medical and absence records and the subsequent verbal

reports of informants even after intervals of 20 years.

3) Diagnoses of all illness episodes were not made on the basis of names reported but on the basis of natural history of symptoms.

4) Chinese culture does not view any illness as shameful or occurring as a result of personal wrong doing. No reluctance to discuss any forms of illness was encountered in the group.

5) Those informants who recounted the least number of illnesses were not necessarily the ones who were least communicative, nor in those subjects did psychological testing necessarily show a predominance of the mental mechanisms of denial, repression, or suppression. Indeed, some of the informants who related the greatest number of illnesses were less willing to communicate other material.

A careful count was made of all illness episodes. Illness episodes for each informant were categorized as: 1) major illness, typified by typhoid fever, infectious hepatitis, psychosis, gouty arthritis, etc.; 2) minor illnesses, typified by common colds, vascular headaches of the migraine type, chickenpox in childhood, etc.; 3) disorders of mood, thought and behavior, including all episodes ranging from brief periods of anxiety and tension to major psychotic episodes. Those illnesses which are not specifically ascribed to disorders of mood, thought and behavior are considered for the purposes of this paper as bodily illnesses. 4)

Each illness episode was assigned a given body system, i.e., cardiovascular, gastrointestinal, skin, etc., based on standard nomenclature. 5) For each informant, a chart was made, relating episodes of illness and the system in which they occurred to age, life events, and perceptions of these events.

A series of graphs was plotted in order to determine 1) the distribution of all illness episodes in the group, 2) the relationship between the occurrence of major and minor illnesses, 3) the relationship between total number of illness episodes and the number of body systems in which they occurred, and 4) the relationship between disorders of mood, thought and behavior, and bodily illnesses.

RESULTS

1) The first plot, relating number of informants to total number of illness episodes per year for each informant, is shown in figure 2. The graph was plotted using number of illness episodes per year so that the age of the informants would not largely determine the number of episodes, i.e., to avoid the obvious error implicit in the fact that those who had lived the longest would have experienced the most illnesses.

The shape of the curve in figure 2 is a negative binominal rather than a poisson or normal distribution curve. The inference is, therefore, that some factor other than chance determines the distribution of illness in the group. Similar data plotted for the American men by Hinkle and Plummer revealed a similarly shaped curve.

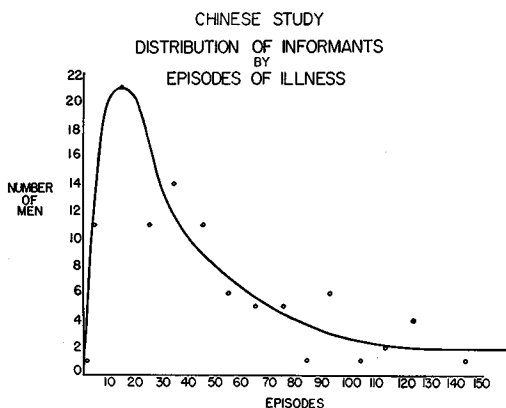


FIG. 2

2) The per cent of the total illness episodes per year occurring in each tenth (decile) of the group was plotted (fig. 3). It is apparent that an ill 10 per cent of the population experienced 28 per cent of all illness episodes per year, while another well 10 per cent experienced only 1 per cent of all illness episodes per year. There are thus more than twenty times as many episodes of illness in the least healthy members of the group as compared to the healthiest members of the group.

3) A chart was made, correlating the total number of bodily systems involved with total number of illness episodes for each of the 100 informants (fig. 4). Inspection of the chart shows that the more illness episodes an informant has experienced, the more likely he is to have a large number of bodily systems involved. The coefficient of correlation for these data is .65, indicating a highly significant relationship.

4) For each informant the total number of major illnesses was plotted against the total number of minor illnesses (fig. 5). Again, it is apparent that those informants who had the greatest number of minor illnesses, in general, had the greatest number of major illnesses, and also that there were no informants who experienced a large number of minor illness episodes without the occurrence of some major illnesses. Conversely, there was none who, having known some major illnesses, experienced no minor illnesses. The coefficient of correlation for these data is .2, indicating a significant positive relationship.

5) For each informant, the total number of disturbances of mood, thought and behavior was plotted against the total number of bodily illnesses (fig. 6). Again, a correlation was

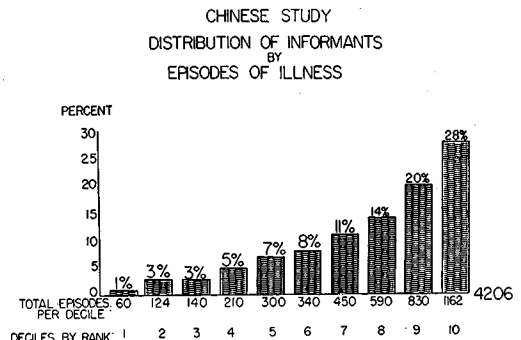
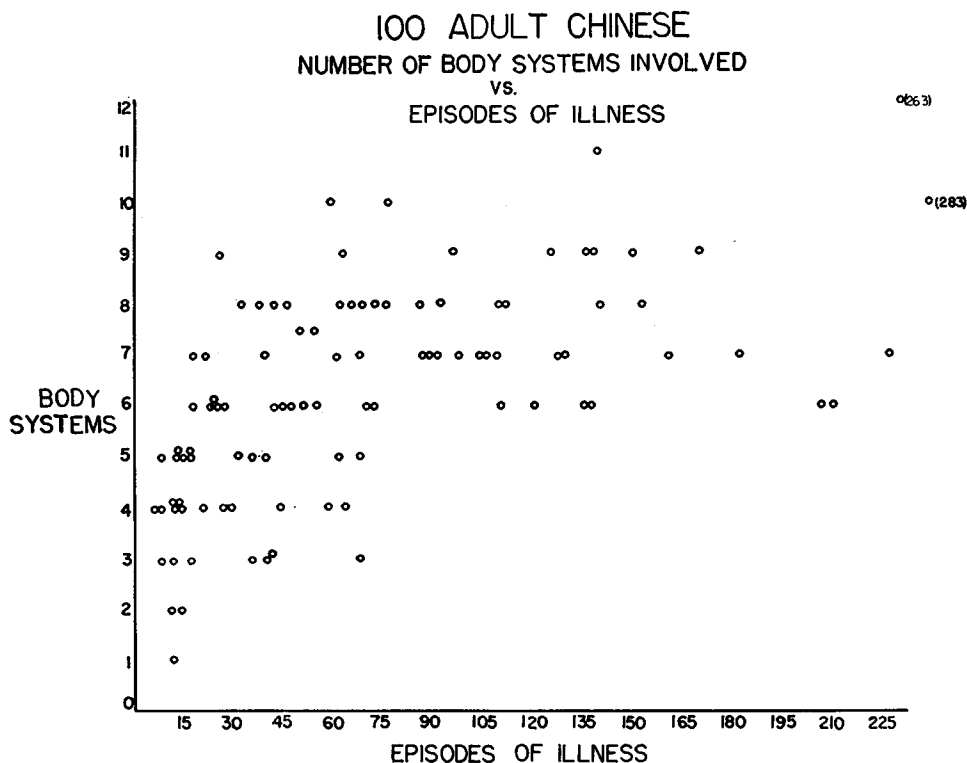


FIG. 3



immediately apparent, such that those informants who experienced the greatest number of bodily illnesses also had the greatest number of disorders of mood, thought and behavior. In this case the correlation coefficient is .45, again indicative of a highly significant positive relationship.

The correlation described in 3), 4), and 5) reflect the similar results in the two American groups. In view of the magnitude of the differences between this group and the previously studied two, the conclusion is evident that certain characteristics about the nature of illness occurrence and distribution are independent of racial and geographic considerations, education, occupation, and many features of the physical and social environment.

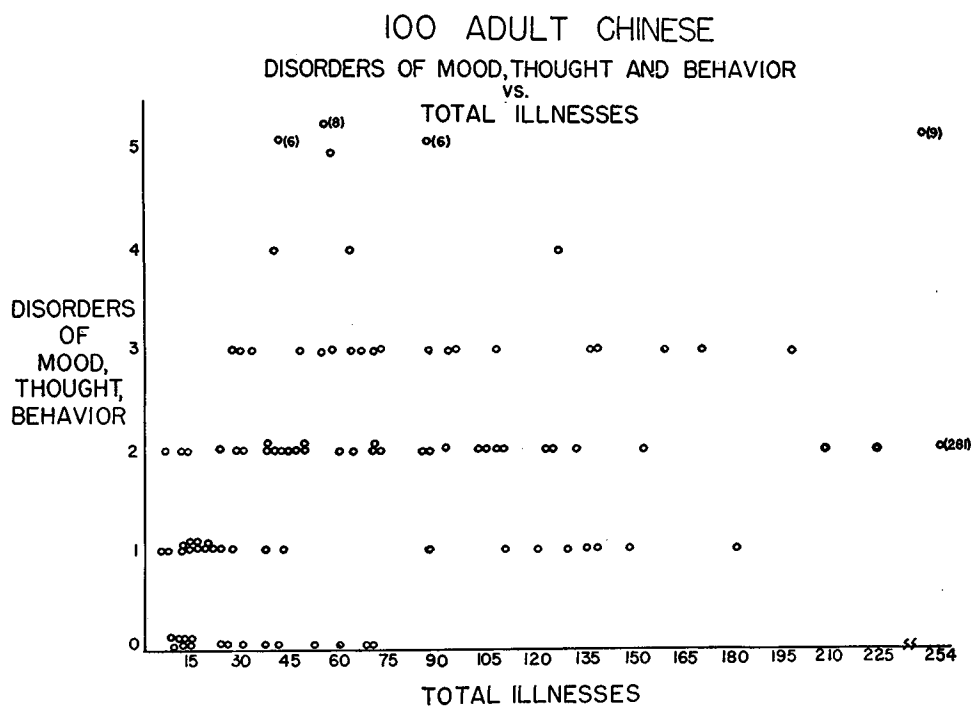
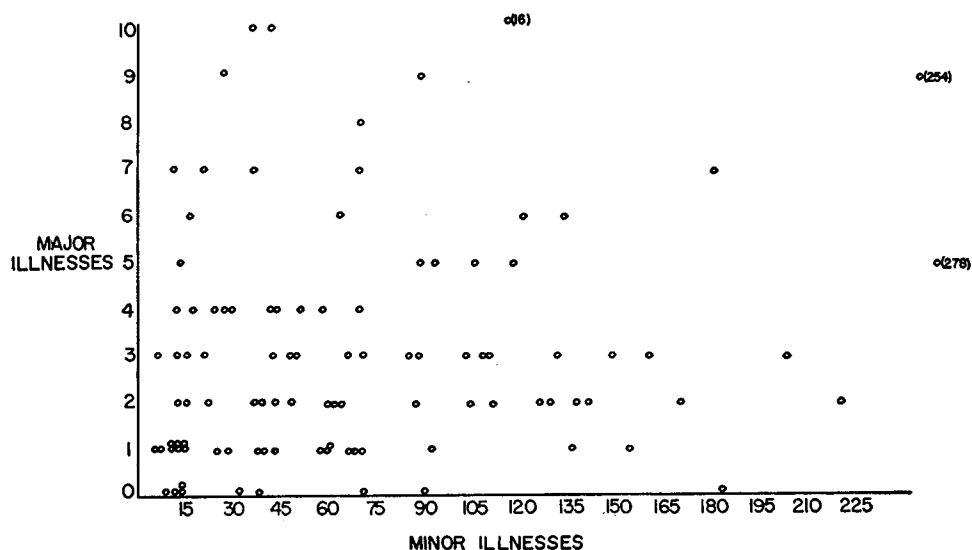
6) The distribution of all types of illnesses by year of occurrence in the lives of these informants was then ascertained. The charts, relating the total number of all types of illness episodes per year to the age of the informant at the time of occurrence, for five informants

were chosen entirely at random and were examined. It was immediately apparent for these 5 informants that the number of illness episodes commonly varied from year to year, and indeed from decade to decade. The pattern of appearance of illness episodes was one of clustering, with many episodes occurring in one or more years contiguous with other periods during which few or no episodes of illness were present. There were no informants in whom approximately the same number of illnesses per year recurred year after year (fig. 7).

7) The previously described clusters of illness episodes were examined more closely in order to determine their nature. It was evident that such clusters were composed not of several episodes of a single illness or, indeed, of several episodes involving a single bodily system. Instead, each illness cluster commonly consisted of episodes involving several bodily systems and occurring at approximately the same time.

The illnesses of a representative informant,

CHINESE STUDY MAJOR vs. MINOR ILLNESSES



shown in figure 8, exhibit two periods of clustering. During the earlier period, there were present concomitantly disorders involving mood, thought and behavior, the respiratory

system, the gastrointestinal system and a general infectious disease. The later cluster exhibited illnesses involving the respiratory, hepatic, cardiovascular and metabolic systems,

CHINESE GROUP
DISTRIBUTION OF ILLNESSES BY AGE
AT TIME OF OCCURRENCE IN
FIVE INFORMANTS

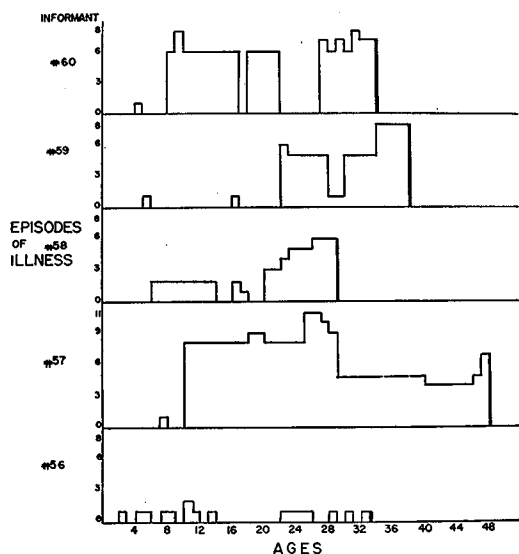


FIG. 7

as well as disorders of mood, thought and behavior. While this informant was chosen because of the fact that his clusters are illustrative, he in no way differs from the other members of the group, any one of whom would illustrate much the same phenomenon.

8) An attempt was then made to ascertain the possible relevance of a number of environmental factors to the clusters of illness. Inspection revealed that such factors as geographic dislocation, physical dangers involved in war, and absence of adequate sanitary facilities were not important governing factors in the group. Indeed, there was no evident correlation with any "objective" events or phenomena. The effects of cultural change and hereditary influences are yet completely to be evaluated.

One immediate correlation was apparent, however. Illnesses of all sorts tended predictably to occur during life periods which the informant perceived as stressful and during which conflicting demands and heavy loads existed in the social environment.

CHINESE STUDY

ILLNESSES EXPERIENCED BY ONE INFORMANT

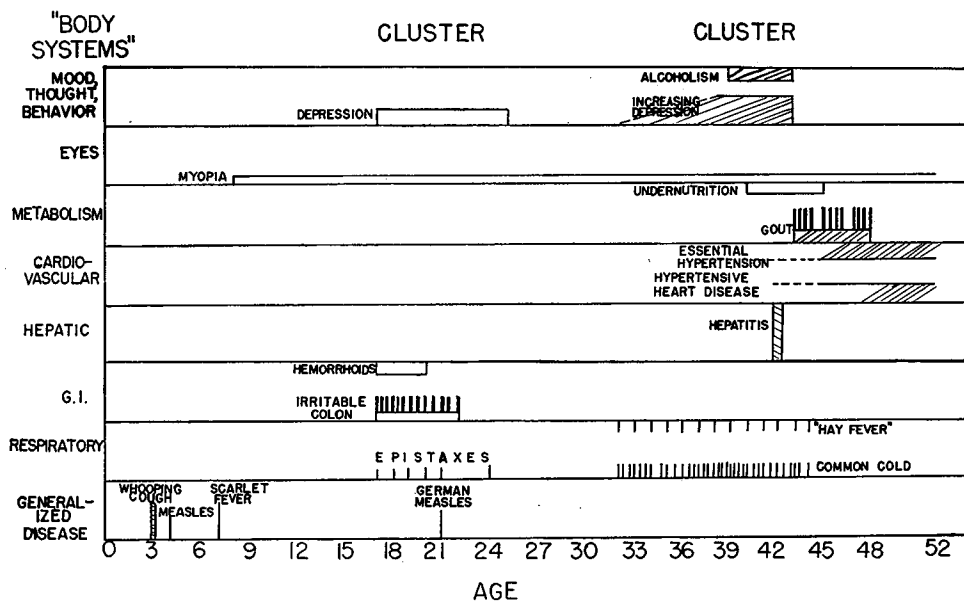


FIG. 8

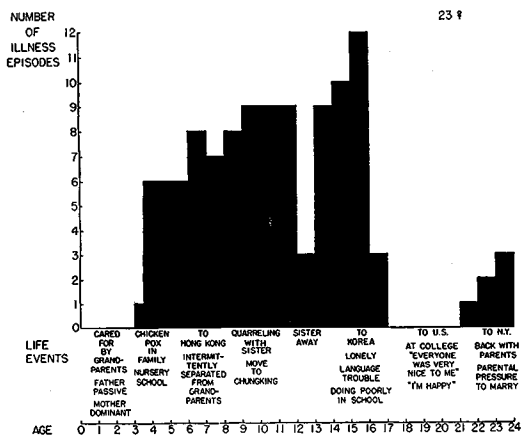


FIG. 9

The life histories and all illness episodes of an ill (fig. 9) and a well (fig. 10) informant serve to illustrate this phenomenon. Both informants have had many similar experiences. Both were born and reared in China, both experienced wartime dislocation, disruption and deprivation. Both came to the United States and have had major changes in life patterns and occupational pursuits here. Both have experienced transient separation from their families.

The ill informant perceived these environmental changes as threatening and met them with attitudes of apprehension and uncertainty. No satisfactory adaptation to most of these situations was worked out, with the result that conflict in the daily social environment was manifest. In these settings, the illnesses in this informant occurred. The well informant on no occasion perceived his life situation as unduly threatening. He felt able to handle the demands of his environment and experienced no notable conflict. Each change as it arose was dealt with satisfactorily. Such relative ease in handling environmental loads either is attributable to individual adaptive capacity, or may be determined largely by the specific abilities of the individual and the unique circumstances of each successive situation, or by both. The relative importance of these factors, as well as considerations of earlier life experiences and cultural changes, is for the moment problematic and the focus of an ongoing study.

Conversely, in the lives of the two informants discussed here, as well as for the group as a

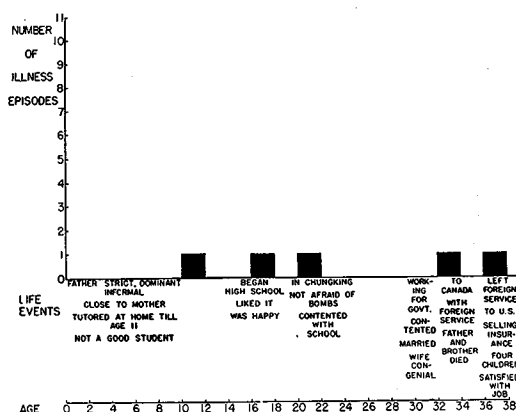


FIG. 10

whole, those periods which were relatively free of illness were perceived as non-threatening, congenial and satisfying.

COMMENT

While it has been generally agreed that disorders of mood, thought and behavior predictably occurred during adverse life experiences and, in recent years, conceded that a few bodily illnesses commonly termed "psychosomatic" may also do so, the thesis that there exists an association between the social environment and most bodily illnesses has never enjoyed widespread advocacy. The material reported herein is consistent with the hypothesis that all forms of illness may be influenced in their onset and course by the bodily changes occurring as part of an individual's attempts to adapt to changes occurring in his social environment.

SUMMARY AND CONCLUSIONS

A group of 100 Chinese, largely young adult graduate students born and reared in China and remaining in this country for a variety of reasons, was studied intensively by investigators representing the disciplines of psychiatry, cultural anthropology, psychology, sociology and internal medicine.

Findings

1) More than half of all illness episodes occurred in 25 per cent of the informants. Another 25 per cent experienced only about 5 per cent of all illnesses. The incidence of all

sorts of illness episodes was thus about 10 times as high in the least healthy members of the group as in the healthiest members of the group.

2) Those informants with the greatest numbers of illnesses experienced a variety of disorders involving many body systems, including infectious, metabolic, traumatic, and degenerative disorders as well as illnesses of unknown etiology and those commonly thought of as "psychosomatic".

3) In the entire group of informants, there was a parallelism between the occurrence of major and minor illnesses such that those with the greatest number of minor illnesses were also those with the greatest number of major illnesses.

4) There was a further parallelism between the occurrence of bodily illness and disorders of mood, thought and behavior such that those informants with the greatest number of bodily illnesses experienced the greatest number of disorders of mood, thought and behavior.

5) In the lives of these informants, illness rarely occurred sporadically or at random, but usually clustered during periods of increased environmental load or conflict-producing life

situations. During such periods, a variety of illnesses was manifest.

6) Those individuals with the greatest number of total illnesses also experienced the greatest number of conflicting demands and loads from their total environment.

These data are consistent with the hypothesis that all forms consistent with the hypothesis in their onset and course by physiologic changes occurring in the individual as part of his attempts to adapt to events and situations arising out of his social environment, and that bodily illnesses and disturbances of feeling state, thought and behavior are independent and sometimes concurrent manifestations of the total disorder produced in the individual during his adaptive processes.

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